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Relationship Of Stump Diameter To D.b.h. For White Oak In The Northeast

This is the eighth report on a series of studies to show the relationship of stump diameter to diameter breast high (d.b.h.) for commercially important tree species in the Northeast.* This report is for white oak (Quercus alba).

In this study 1,266 stump-diameter measurements were used, ranging from 4 inches to 46 inches. Both stump diameter and d.b.h. were measured to the nearest 1/10-inch with a diameter tape. To obtain diameter inside bark, bark thickness was measured with a Swedish bark gage. Stump heights were measured on the uphill side to the nearest 1/10-foot.

It was found that 61 percent of the stumps left on logging operations were between 0.6 and 1.8 feet high; 10 percent were higher than 1.8 feet; and 29 percent were lower than 0.6 foot.

In the computations, inside-bark stump diameters were used to avoid inaccuracies due to unequal bark thickness, logging damage to bark, and bark peeling off. Stump diameters were sorted into 2-inch classes. Stump-height measurements were sorted into 0.6-foot classes within each stump-diameter class.

To develop an equation expressing the stump diameter --d.b.h. relationship for white oak, the method described by Deming** was used. The following equation was obtained:

D.b.h. = 0.953 (stump d.i.b.) + 1.692 (stump height) - 3.645

The relationships developed from this equation were worked out as a graph (fig. 1).

To determine the 2-inch d.b.h. class of a white-oak stump from this graph, you merely plot the intersection of the vertical ordinate (stump height) with the horizontal

ordinate (stump diameter). For example, for a stump 16.0 inches in diameter and 1.4 feet high, the two lines intersect about halfway between the two limits of the 14-inch d.b.h. class.

Comparison of actual d.b.h.'s and those calculated with the equation showed an average weighted difference of 0.05 inch. The standard error of estimate for all data was 1.192 inch. At the mean of stump diameters, you can expect 60 percent of the estimates of d.b.h. to fall in the correct 2-inch d.b.h. class. Another 31 percent can be expected to fall one class above or below the correct one; and 9 percent will fall outside this range. These errors are compensating. As the stump diameters increase beyond the mean of these data, the error will also increase. These differences result from the irregular shape of the stump top--due often to abnormal butt swelling or flaring roots.

(If you use the graph by 1-inch d.b.h. classes, this is what you can expect: 33 percent of the estimates should fall in the correct 1-inch d.b.h. class; 47 percent should fall one class above or below it; and 20 percent should fall outside this range.)

For all practical purposes this graph is expected to give reliable d.b.h. estimates for white oak anywhere in the Northeast.

--FREDERICK E. HAMPF
Forester (Mensuration)
Division of Forest Economics
Northeastern Forest Experiment Station
Forest Service, U.S. Dept. Agriculture

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*For earlier reports on these studies see Forest Research Note No. 38 (white pine), No. 42 (sugar maple), No. 43 (American beech), No. 45 (yellow birch), No. 46 (northern red oak), No. 55 (yellow poplar), and No. 65 (pitch pine).

**Deming, W. Edwards. Statistical adjustment of data. 261 pp., illus. Wiley & Sons, New York. 1938.

STUMP DIAMETER – D.B.H RELATIONSHIP FOR WHITE-OAK IN THE NORTHEAST